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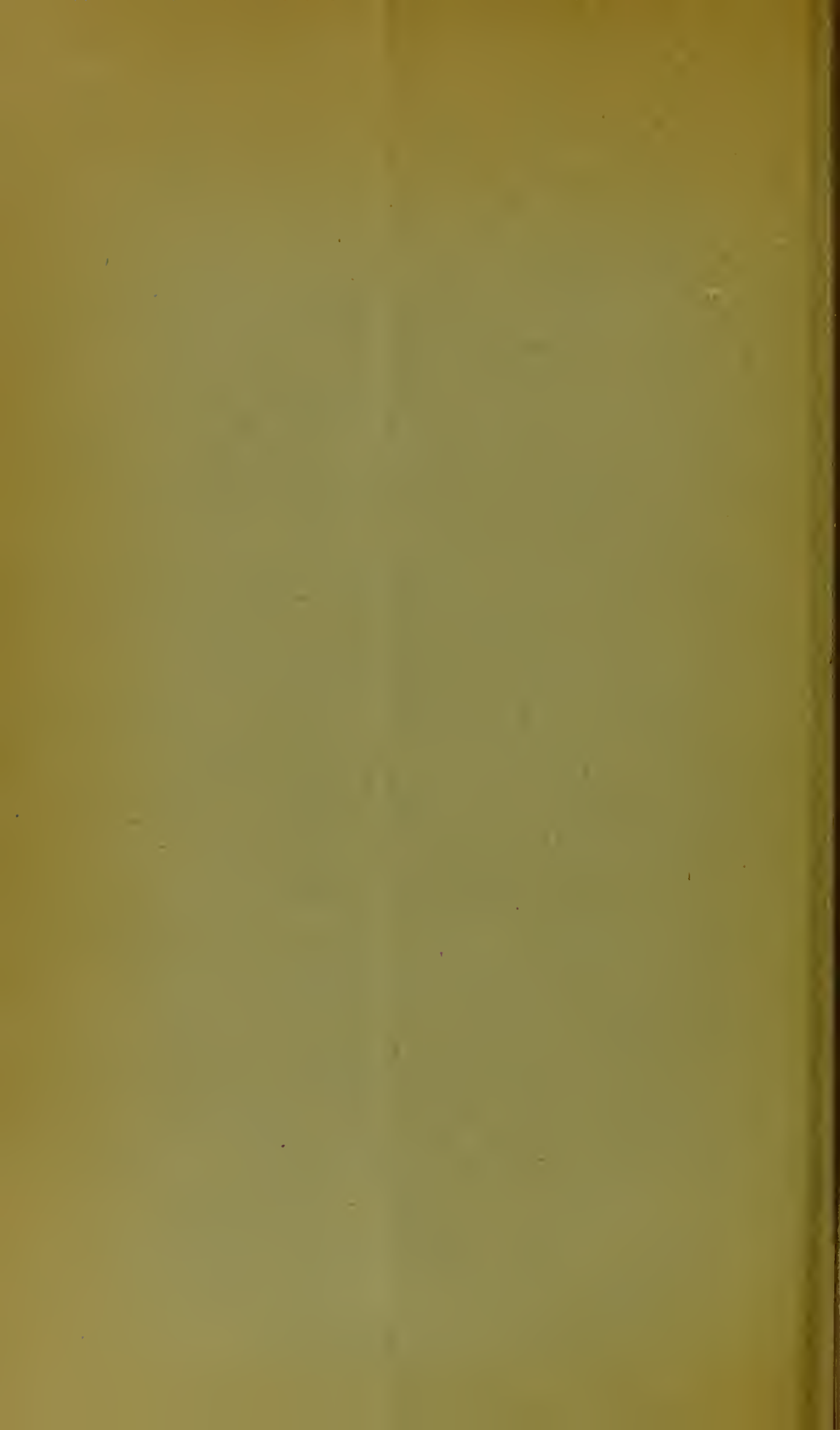
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THE affections of the nose and its sinuses which produce, among other symptoms, more or less severe headache, naturally divide themselves into (1) non-inflammatory and (2) inflammatory conditions.

1. The non-inflammatory group represents the class of cases, with hypertrophies of the middle turbinate bone, which press against the septum. The latter may or may not be deflected. Or there may be in this group adhesions between the inferior turbinate and septum, or between the inferior and middle turbinates and the septum. Or, again, the turbinate may be of practically normal size, but may be pressed upon by a markedly deflected septum. These so-called pressure cases are responsible for a large number of headaches. This group may be divided into two subdivisions. In (*a*) the pain occurs in individuals not constitutionally prone to headaches; while (*b*) represents cases which have what we

might term a neuropathic temperament plus pressure within the nose. In these people the sensibility to pain is a heritage. Usually there is a family history of migraine, neurasthenia, epilepsy, alcoholism, rheumatism, or gout. These patients have a low reserve of nervous endurance and readily succumb to slight continuous peripheral irritation.

2. The inflammatory group may likewise be divided into two subdivisions: (a) including cases where there is pressure within the nose, plus chronic sinusitis; while (b) deals with acute sinusitis.

1. (a). *Pure Pressure Cases.*

CASE 1.—Almost constant left-sided supra-orbital headache since childhood. Marked deflection of nasal septum to left, pressing against middle turbinate. Submucous resection. Complete cure of headache.

Mrs. H., age 38, gives a history of an injury to the nose in childhood. She has had headache since childhood, growing worse in the last ten years. Pain is complained of almost constantly, and is felt above the left brow and in the left temple. The pain is dull with occasional severe exacerbations, when it becomes acute and is then accompanied by vomiting.

*Examination.*—The nasal septum shows an acute angular deviation to the right, close to the floor of the nose. There is a corresponding sulcus on the left side with a slight deviation to the left, completely obliterating the view of the middle turbinate on that side. There is compensatory hypertrophy of the left inferior and of the right middle turbinate. Adrenalin applied to the left side of the nose gives temporary relief.

*Operation.*—A submucous resection was performed, removing the deformed parts of the septum.

Six months later the patient reports that she has been absolutely free from headache since operation.

CASE 2.—Unilateral headache of twenty years' duration; deflection of septum to left with adhesion to middle turbinate. Submucous resection of septum and separa-

tion of adhesion, followed by complete relief from headache.

Mr. G. M., age 23. Habits temperate. No venereal disease. Two attacks of rheumatic fever, 8 and 18 years ago. Malaria in childhood. Series of boils on the neck in 1904, lasting seven months. Occasionally subject to eczema. Bilious attacks off and on all his life. Dyspepsia from 1895 to 1900. For twenty years has had unilateral headache, growing gradually worse until now it occurs daily. It comes on at eleven o'clock and increases in severity until bedtime. He is frequently obliged to give up his work in the afternoon and go to bed. Headache is worse in the summer-time. Pain is felt over the left side of the bridge of the nose, over the left supra-orbital region, and in the left temple. It is rarely accompanied by vomiting.

*Examination.*—Nasal mucosa and turbinates normal. Septum deflected to the left, deviation beginning  $\frac{1}{2}$  inch above the floor of the nose and extending above the left middle turbinate, which is firmly adherent to it.

*Operation, December, 1906.*—A submucous resection was done, removing the septum to a point above the middle turbinate and back almost to the naso-pharynx. The middle turbinate was then separated from the septum. From the time of operation to the present, the patient has not had a single headache.

CASE 3.—Dull pain over left eyebrow. Long adhesion between inferior turbinate and septum. Operation. Cure of pain.

Mrs. H. S., 25 years of age. Good family history. Tonsils were removed one month ago for recurrent quinsy. For five or six years she has suffered from a dull supraorbital pain, sharply localized, coming on every morning and lasting one or two hours. There is a post-nasal discharge, greenish in character.

*Operation, November 26, 1907.*—A long adhesion between left inferior turbinate and septum was removed by a submucous resection of septum over point of contact. No headache since operation.

1. (b). *Pain Caused by Septal Turbinate Contact in a Person Constitutionally Prone to Headache.*

CASE 4.—Headaches of a migrainous type, due to middle turbinate bones pressing tightly against the septum. Partial bilateral turbinectomy, followed by entire relief from the pain on one side of the head, and marked diminution of that felt on the other side.

Mrs. K. G. M., age 35. Her mother suffered from typical migraine. Sick headaches from the age of four to fourteen, occurring at intervals of one to two months. These headaches are accompanied by vertigo, vomiting, some aphasia, ocular disturbances (scintillating scotoma), and numbness of the extremities. The headaches are sudden in their onset and in their disappearance, lasting only a few hours. The pain is of a pounding, pulsating character, and is felt all over the front of the head. From puberty until twenty-two she did not have a single headache. At twenty-two, after severe exposure to cold during menstruation, the headaches returned in their old form, with the exception that the vertigo and vomiting were absent. From this time until the time of operation the headaches occurred from one week' to one month apart, depending largely upon the patient's general condition. The use of glasses gave no relief.

*Examination.*—Anterior ends of both middle turbinates press tightly against the septum.

*Operation, October, 1905.*—The anterior tip of the right middle turbinate was removed, with complete relief of the headache on that side of the head. Following this operation the headaches still occurred at the same intervals, with pain only, however, on the left side.

Fourteen months later the anterior tip of the left turbinate was removed. Since then the character of the headaches has changed. They occur at much longer intervals, the pain is dull, the ocular symptoms are much diminished, aphasia and numbness of the extremities are absent. On the left side of the nose the turbinate contact is not entirely relieved. The patient's headaches now originate over the left eyebrow, and can always be aborted by the application of cocaine to



the left middle turbinate. It will undoubtedly be necessary to operate again, to remove that portion of the left middle turbinate which is in contact with the septum before the headaches are entirely cured.

2. (a). *Cases where the Headache is Due to Enlarged Turbinates, plus Chronic Sinusitis.*

CASE 5.—Asthmatic patient who suffered from supra-orbital, frontal, and occipital headache for three years. Polypoid degeneration of the middle turbinates, ethmoiditis. Operation. Complete cure of headache.

Mrs. J. P. age 20. Presented herself in September, 1907, complaining of dyspnœa, frequent asthmatic attacks, cough, weakness, loss of flesh, and constant severe pounding headache in the supraorbital, frontal, and occipital regions. These symptoms have been present for three years.

*Examination.*—Polypoid degeneration of both middle turbinates, with a profuse mucoid and occasional muco-purulent discharge from both nares.

*Operation.*—Removed middle turbinate and curetted anterior ethmoidal cells of one nostril. After a short interval, performed same operation on the other nostril.

At the present time, headache has entirely disappeared, cough and dyspnœa are not complained of except to a slight extent on exertion, the asthmatic attacks are light and of rare occurrence, and the nasal discharge is much improved. Weight has increased 15 pounds.

CASE 6.—Bilateral, supraorbital, and temporal headache since childhood, due to hypertrophied middle turbinate bones, with ethmoiditis. Cured by partial bilateral turbinectomy.

Mrs. E. K., age 25. Headaches since childhood. Pain is felt almost constantly in the supraorbital and temporal regions, usually on both sides at the same time, though occasionally only on one side. The pain is dull and is increased by bending forward. The pain increases in severity when the patient catches cold or when her nose becomes congested

from any cause. Coryzas are frequent and are accompanied by a thick yellowish discharge through both anterior and posterior nares.

*Examination.*—Both middle turbinates are enlarged and impinge against the external nasal wall for about one-half their length antero-posteriorly.

*Operation.*—The anterior portions of both middle turbinates were removed, and the remaining portions trimmed so as to relieve septal contact.

Three months later patient reports by letter that she is entirely cured of her headache.

CASE 7.—Supraorbital headache, with pressure sensations over bridge of nose, caused by bilateral chronic suppuration of the frontal and maxillary sinuses. Operation, followed by improvement.

A. J., male, age 23. Nine years ago, after being nearly frozen to death, he noticed a purulent discharge from the right side of the nose. Four years ago a discharge of a similar character made its appearance in the left nostril. At the same time a dull supraorbital headache developed. At present dull pain is felt over both eyebrows, and pressure symptoms over the bridge of the nose. The patient complains of lassitude and mental dulness.

*Examination.*—Patient's breath has a foul odor. A thick, yellow, scanty, purulent discharge is seen in the anterior and posterior nares. Nasal septum deviated somewhat to the left, with a prominent ridge over the line of deviation. Both middle turbinates are enlarged and polypoid, the left one impinging tightly against the septum. Transillumination reveals nothing. Trochar puncture and irrigation of maxillary sinuses brings away some scanty, thick, foul pus. There is some tenderness to pressure over the floor of the frontal sinuses.

*Operation, June, 1907.*—About half of each middle turbinate was removed, with the anterior ethmoidal cells. Both maxillary sinuses were opened through the inferior meatuses, and permanent drainage was established. The patient, being intelligent, was taught to attend to the irrigation of these sinuses himself.



At the present writing the patient reports the left maxillary sinus free from discharge. From the right he occasionally washes out a little thick pus. The mental lassitude has entirely gone and the headaches have disappeared, except for slight dull pain occasionally experienced in the right supraorbital region. It will probably be necessary to do a radical operation on this side.

2. (b). *Acute Sinusitis.*

CASE 8.—Right supraorbital headache, pain over right maxillary antrum and in teeth of upper jaw, together with right-sided exophthalmos caused by acute frontal and maxillary sinusitis following influenza. Intranasal operation. Relief.

Mrs. G. H. H., age 25. Was seen by one of us (Cocks) in consultation with Dr. J. H. Borden, of Tarrytown, N. Y. The patient, who is nursing a child of 8 months, has always been well excepting for typhoid fever four years ago. This was followed by a cold in the head and some frontal headache, lasting two weeks.

Eleven days ago had influenza with sore throat, fever, and pain in the limbs. Five days later, dull pain developed over right maxillary antrum, which was present almost constantly. The teeth of the right side of the upper jaw ached. There was also tenderness of the roof of the right side of the mouth. Two days later she experienced intense pain over the right eyebrow, temple, and ear. The pain over the antrum of Highmore abated somewhat after a few days, but the frontal headache was severe enough to necessitate a dose of morphine.

When first seen on January 2, 1908, the temperature registered 101.5° by mouth.

*Examination.*—Slight swelling of the cheek over right maxillary antrum, and moderate right exophthalmos. Nose narrow. Low deflection of septum into right nostril with corresponding sulcus in left. Right middle turbinate is somewhat hypertrophied, slightly polypoid, and adherent to septum anteriorly. Pus between turbinate and external wall.

*Operation.*—As patient's pain was increasing, in spite of

treatment for four days by nasal irrigations and the use of adrenalin, the anterior portion of right middle turbinate was removed and the right maxillary antrum pierced with a trochar. Irrigation of antrum washed out considerable pus. Result: the exophthalmos and antral pain disappeared in 24 hours. The temperature became normal two days later, and the supraorbital pain was completely gone five days after operation.

CASE 9.—Headache, pain over right antrum of Highmore, and aching of teeth from acute maxillary sinusitis caused by influenza. Nasal irrigations. Complete relief.

M. S., young woman, 19 years old. Always well except for present illness. December 21, 1907, prostration, fever, running from both nostrils, headache beginning in front and extending to occipital region. On December 24th, the pain localized over right maxillary antrum. Dull aching pains were also felt in back of right eyeball and in temple. Dull, almost constant, aching pains in teeth of right upper and, to a certain degree, in those of right lower jaw. On December 27th, she noticed a yellowish discharge from the right nostril. The discharge from the left has disappeared.

*Examination.*—Marked tenderness over anterior surface of right maxillary antrum. Right middle turbinate is swollen and in contact with septum anteriorly. Between external nasal wall and right middle turbinate is considerable pus. Temperature varies between 99° and 101° F. by mouth.

*Treatment.*—The pain and other symptoms were completely relieved in 36 hours by nasal irrigations of hot boric acid, preceded by the use of adrenalin. Coal tar products were given internally, but this last is usually unnecessary.

CASE 10.—Pain over right supraorbital region due to acute frontal sinusitis, following grip. Simulates supra-orbital neuralgia. Treatment by irrigation. Relief of pain.

Anna T., 21 years old, contracted influenza three weeks ago. One week ago complained of pain over right supra-orbital region, which was severe and almost constant.

*Examination.*—No tenderness over frontal sinus and no

temperature, yet the middle turbinate of the right side is large and puffy, and a discharge of yellowish pus is seen coming down between it and the external nasal wall. Treatment—adrenalin and irrigations—completely relieved the pain in 24 hours.

In the *Annals of Otology, Rhinology, and Laryngology*, February, 1902, DR. JONATHAN WRIGHT reported a unique and instructive case of isolated, unilateral, chronic empyæma of the sphenoidal sinus, causing headache, delirium, and mental symptoms. Operation resulted in complete recovery. Almost a year before the patient came under observation he had an attack of grip, accompanied by coryza and pain in the head. Six months later he again suffered from severe headache, of several weeks' duration, but on this occasion there were no nasal symptoms. After a month or six weeks the pain returned with great severity. It was of a bursting, boring character, and was felt over the vertex, occiput, and left side of the head. There was great hyperæsthesia of the scalp. He had frequent attacks of sneezing, and occasionally expectorated lumps of mucus. A low wandering delirium finally developed and the patient took to his bed.

Examination of the nose was negative. The ophthalmoscope revealed a slight neuro-retinitis.

Operation under general narcosis, by the intranasal route, about eleven months after the onset of his original symptoms, revealed a left-sided sphenoidal empyæma. An external operation a week later, performed for the relief of the persistent delirium, demonstrated the fact that the other sinuses were normal. Seventeen days after the first operation the patient was completely cured.

*Résumé:* These cases represent fairly well the different types of headache due to lesions within the nose and sinuses. In the first three cases the headache was due to pressure. Mere septal turbinate contact is not sufficient to give rise to pain when the individuals are not constitutionally prone to headache. To cause pain there must be considerable pressure. As a rule the pain is fairly well localized over the affected side or sides. It is felt in the orbit, the nasal bridge, and often in the temple.

It is always aggravated by any nasal irritation, and is often temporarily relieved by the application of adrenalin or cocaine to the affected region within the nose.

In Case 4 there is an absence of the tendency which the pure pressure cases show toward exact localization of the pain to certain well-defined areas. This is doubtless because the patient has a migrainous temperament. Her pain was pounding and pulsating in character, and was felt all over the front of the head. It will be necessary to remove the septal turbinate contact, which still persists in one nostril, before the woman is completely relieved from the occasional unilateral pain from which she suffers.

In Case 5 the pain was supraorbital, frontal, and occipital, due to chronic ethmoiditis plus polypoid middle turbinates.

In Case 6 the ethmoiditis apparently did not change the character of the headache, which was supraorbital and temporal, but fairly well defined.

Case 7 suffered from supraorbital headache, pressure sensations over the bridge of the nose, and considerable mental lassitude and dulness. The last two symptoms were relieved very promptly by draining the maxillary antra, from which there had been considerable absorption of septic material.

Hajek, in his book, *Die Krankheiten der Nebenhöhlen der Nase*, says: "Headache is a frequent though not constant symptom in all cases of inflammatory disease of the nasal accessory sinuses. In an individual case headache may be very inconstant. Intervals in which the patient is entirely free from pain may alternate with periods of the most intense pain."

The explanation is simple. There may be an exacerbation of a chronic empyæma, or there may be accumulation of secretion caused by the temporary closure of the excretory duct.

We have found that localization of pain in certain regions of the head is not typical for the affections of the



different sinuses. For example, pain in the forehead may be caused by inflammation of the frontal, ethmoidal, maxillary, or even the sphenoidal sinus. On the other hand, the characteristic pain of sphenoidal disease is felt in the occiput, behind the bulb—as one writer has expressed it,—or over the vertex. In maxillary sinusitis the usual point for the pain is over the anterior surface of the antrum, as well as in the teeth of the corresponding side of the upper jaw. Frontal sinusitis generally produces pain in the forehead, especially over the course of the supraorbital nerve. In many cases of frontal-sinus inflammation the pain is characterized by periodicity. At a certain time in the morning, usually ten or eleven o'clock, furious pains are felt over the affected sinus which persist for hours—perhaps until one, two, or even four o'clock in the afternoon—and then suddenly disappear. For the remainder of the afternoon and during the entire night the patient remains free from pain. On the following day the pain recurs at exactly the same hour.

From a review of the nerve supply of the nasal fossæ and cavities, we can explain the location of the pain in certain of the sinuses, but not in all. The innervation of the nose includes the special olfactory fibres which have to do with the sense of smell,—but which do not concern us here,—and those of common sensation derived from the ophthalmic and superior maxillary divisions of the trigeminal nerve. The lateral wall of the nasal fossa is supplied from several sources, including the upper posterior nasal branches from Meckel's ganglion, and the lower posterior nasal branches from the larger palatine nerve behind; and, in front, the external division of the nasal nerve and the nasal branch of the anterior superior dental, which also distributes twigs to the floor of the fossæ. The septum receives its chief supply from the naso-palatine nerve, supplemented by branches from Meckel's ganglion behind, and, by the internal division of the nasal nerve in front. The mucous-membrane lining the antrum



receives filaments from the infraorbital nerve by means of its superior dental branches. The frontal sinus is supplied by twigs from the supraorbital and the nasal nerves; the ethmoidal air cells, by minute branches from the nasal; and the sphenoidal sinus, by filaments from the spheno-palatine ganglion.

We see, therefore, why, in the case of frontal-sinus disease, pain is referred to a point in the forehead over the anterior wall of the sinus, corresponding to the distribution of the supraorbital nerve. In the same way, in the case of the maxillary antrum—which, as we have just seen, is supplied by twigs from the infraorbital nerve—we can account for the pain being felt in the cheek and in the teeth. Hajek has suggested that there is set up a kind of neuritis of the nerve in question. When we try to explain why pain from disease of the sphenoidal sinus is usually experienced in the occiput, we fail to find any reason why sensory impulses coming from this particular sinus to Meckel's ganglion should be experienced as pain in the occipital region. The paths of the afferent nerve fibres in this locality have not yet been accurately worked out.

We have tried to show from the study of these cases what an important place the nose and its accessory sinuses occupy in the production of headache, and how necessary it is to carefully examine these organs when confronted with an obscure case.